RCNP EXPERIMENT E147

PROPOSAL FOR EXPERIMENT AT RCNP

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TITLE:
Extraction of the differences for neutron density distributions in in ^{116}Sn and ^{118}Sn and ^{120}Sn

SPOKESPERSON:

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EXPERIMENTAL GROUPS:

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RUNNING TIME:	**11 days**
BEAM REQUIREMENTS: Type of particle	**Polarized Protons**
Beam energy	**300 MeV**
Beam intensity	**2-800 nA**
Other requirements	**energy resolution** < 300 **keV**

BUDGET:

Experimental expenses	**2,500,000 yen**

SUMMARY OF THE PROPOSAL

In the experiment of E109 we have succeeded to perform a complete experiment for the elastic scattering of polarized protons off ^{120}Sn at Ep=300 MeV. In the analysis of the data we have deduced the density distribution of the neutrons in ^{120}Sn, if we assume the the density distribution of protons deduced from the electron scattering. According to the analysis, the neutron distribution for ^{120}Sn has a peculiar shape which has a bump at the center of the nuclei. This bump reflects the increase of neutron density due to the $3S_{1/2}$ orbit. Similar increase of neutron densities due to the $3S_{1/2}$ orbit netrons are predicted by the relativistic Hartree model calculations for nuclei of ^{120}Sn, whereas the RH model calculation for ^{118}Sn predicts the decrease of density distribution of neutrons at the nuclear center due to the nonexistance of the $3S_{1/2}$ neutrons. The RIA calculation of the proton elastic scattering for for ^{118}Sn and ^{120}Sn predicts the differences of differential cross sections of about 30 percent. We think the effect of occupancy of diffrent orbits is discernible by the elastic scattering. Thus in order to confirm the density distribution obtained for the scattering off scattering off ^{116,118}Sn. In order to enhance the accuracy of the relative cross section measurement, we are going to prepare an automatic target changer, which can change the target isotopes every 1 minutes without interrupting the beam.